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ENTOMOLOGICAL NEWS

VOL. LIV JULY, 1943 No. 7

New Species of Crossidius from Western North America (Coleoptera: Cerambycidae).

By E. GORTON LINSLEY, University of California, Berkeley

Crossidius ruficollis new species

Male:—Form elongate, narrow, subparallel; head, antennae, scutellum, legs, meso- and metathoracic sterna black, prothorax and abdomen rufous; elytra testaceous with a black sutural stripe over apical three fifths; pubescence short, fine, pale. *Head* coarsely, closely punctate, occipital region transversely rugose; antennae slender, much longer than body, black, basal segments sometimes vaguely piceous. Pronotum approximately one and one-half times as wide as long, sides tuberculate, surface coarsely punctate, interspaces feebly shining, very sparsely pubescent; prosternum very coarsely punctate, sparsely pubescent; meso- and metasterna finely punctate, more densely clothed with fine, appressed pale pubescence. *Elytra* two and one-half times as long as broad, wider at base than pronotum at middle, basal punctures smaller than those of pronotum, becoming finer apically; pubescence fine, sparse, appressed; apices subtruncate at suture. *Legs* slender, coarsely punctate, thinly clothed with moderately long suberect pale hairs. *Abdomen* with sternites finely punctate, thinly clothed with appressed pale pubescence; fifth abdominal sternite subtruncate or feebly emarginate at apex. Length 11–16 mm.

Female:—Form a little more robust; antennae distinctly shorter than the body, intermediate segments three or more times as long as broad; elytra with humeri and often basal margin narrowly black, and a broad black sutural band which covers about two-thirds of the width of the elytra over apical one-half then narrows anteriorly to suture at basal two-fifths; abdomen with fifth sternite broadly rounded at apex. Length 11–15 mm.

Holotype: male (No. 5346, Calif. Acad. Sci., Ent.), allotype female (No. 5347) and twenty-one paratypes collected in Kern Co., CALIFORNIA, in September, 1931 by Mr. F. T. Scott, who kindly presented them to the writer. Paratypes are placed in the collections of the California Academy of Sciences, The Academy of Natural Sciences of Philadelphia, F. T. Scott, and the writer.

Compared with *C. punctatus* Lec., which has similar elytral markings, this species differs by having the pronotum rufous in both sexes, coarsely punctate and sparsely pubescent, the antennae of the male much longer than the body, those of the female with the intermediate segments three or more times as long as broad. It is also more slender, with the elytra two and one-half times as long as broad and the pubescence short.

Crossidius brunneipennis new species

Male:—Form very robust; color black or dark brown, elytra reddish brown; pubescence long, dense, whitish or ochraceous. *Head* coarsely, closely punctate, punctures obscured by pubescence; antennae slender, nearly one and one-half times as long as body. *Pronotum* wider than long, sides rounded, very coarsely punctate, densely clothed with long, coarse, erect and suberect pale hairs, sparser on disk; prosternum coarsely punctate, clothed with long, coarse, erect and suberect pale hairs; meso- and metasterna more finely punctate, clothed with long, appressed or suberect pale hairs; scutellum densely clothed with long, fine whitish pubescence. *Elytra* barely more than twice as long as broad, wider at base than pronotum at middle, surface densely punctate, basal punctures coarse, becoming finer apically; costae scarcely evident; pubescence moderately long, coarse, suberect, pale, rather uniform; apices subtruncate, suture armed with a short spine. *Legs* slender, coarsely punctate, thinly clothed with pale hairs; anterior tibiae with a dense pad of short, velvety pubescence on inner side. *Abdomen* with sternites finely, closely punctate, moderately densely and uniformly clothed with long, fine appressed pale pubescence which does not hide the punctation. Length 18 mm.

Female:—Antennae about two-thirds as long as body; prosternum more finely punctate; elytral apices emarginate, sutural angle dentiform. Length 15 mm.

Holotype: male (No. 5348, Calif. Acad. Sci., Ent.), and allotype female (No. 5349) collected at Ash, NEVADA, Jan. 10, 1940, by Mr. Ira La Rivers, to whom the writer is indebted for the privilege of studying the specimens.

This is possibly the largest and most robust species of the genus and may be readily recognized by the form and coloration. It is related to *C. ater* Lec. from which it may be distinguished by the larger size, more robust form, reddish brown elytra, densely white-pubescent scutellum, more densely pubescent pronotum and abdomen and the form of the elytral apices.

The Identity of Neoempheria flavohirta (Coq.) n. comb. and Neoempheria digitalis Fisher. (Diptera: Mycetophilidae.)

By ELIZABETH G. FISHER, Research Associate, The Academy of Natural Sciences of Philadelphia.

A rare species, treated by Johannsen as *Mycomya flavohirta,* I consider to belong to the genus *Neoempheria* because vein C ends at R_5 before the wing tip, a faint spurious vein is present in cell R_5, and the male terminalia are of the *Neoempheria* rather than the *Mycomyia* type.

This species differs from all other Nearctic *Neoempheria* in the hyaline wings.

I have examined the type which agrees with the specimen figured here. The specimen in the Johannsen Collection (figured by the author in her thesis, Cornell University, 1937) is neither conspecific nor congeneric with this species. The only specimens known to the author have been examined and are listed below. The British Columbian females may possibly be distinct.

Neoempheria flavohirta (Coquillett) (Figs. 1 and 2.)

Sciophila n. sp., Slosson, Ent. News, IX, p. 252, 1898.

Sciophila flavohirta Coquillett, Proc. U. S. Nat. Mus., XXIII, 595, 1901.

Mycomya flavohirta Johannsen, Genera Insectorum, fasc. 93, p. 47, 1909. Johannsen, Maine Agr. Exp. Sta., Bull. no. 180, p. 182, 1910. Johnson, Occas. Papers Boston Soc. Nat. Hist., VII, p. 81, 1925.

Male: Total length 6 mm. Head black above; face and palpi yellow. Scape yellow, the distal edge of its basal segment with a ventral black streak. Flagellum yellow basally, black distally. Ocelli two.

Thorax entirely yellow with no indications of mesonotal stripes. Scutellum with four marginal setae.

Legs yellow. Fore basitarsus shorter than its tibia; microtrichia regularly arranged. No mesocoxal spurs.

Wings hyaline. C ends at R_5 but before the wing tip; Sc_1 ends in C; Sc_2 ends over the middle of small cell R_1; cell R_1 about three times as long as wide; a faint spurious vein in cell R_4; petiole of M shorter than M_3; Cu forks proximad of the base of R_5. Microtrichia of the wing membrane irregularly arranged. Halteres yellow.

Abdomen yellow; the sixth tergite black. Terminalium yellow; unusually large; tip of ninth tergite black with strong black setae.

New Hampshire: Franconia, Grafton Co., (Mrs. A. T. Slosson), [1 ♂ *type,* U.S.N.M.]. Same data, [2 ♀, U.S.N.M.]. (Slosson, 1898; Coquillett, 1901; Johannsen, 1910; Johnson, 1925.)

British Columbia: Kaslo, (H. G. Dyar), [2 ♀, U.S.N.M.].

Washington: Swauk Creek, Kittias Co., June 28, (A. L. Melander), [1 ♂, A.L.M.].

Neoempheria digitalis Fisher is the male of *Neoempheria didyma* (Loew). The synonomy and known distribution are given below.

Neoempheria didyma (Loew)

Sciophila bimaculata Loew (nec von Roser), Berl. Ent. Zeit., X, p. 6, 1866.

Empheria didyma Loew, Berl. Ent. Zeit., XIII, p. 136, 1869.

Neoempheria didyma Johannsen, Maine Agr. Exp. Sta. Bull. no. 180, p. 160. Smith, Ann. Rep. N. J. State Mus., 1909, p. 723, 1910.

Neoempheria digitalis Fisher, Jour. New York Ent. Soc., XLV, p. 390, 391, 1937.

I have examined specimens from: Ontario (English River, type locality); Maine; New Hampshire; Massachusetts; New York; Pennsylvania; Virginia; Michigan and Wisconsin. The species has also been recorded from Vermont and New Jersey.

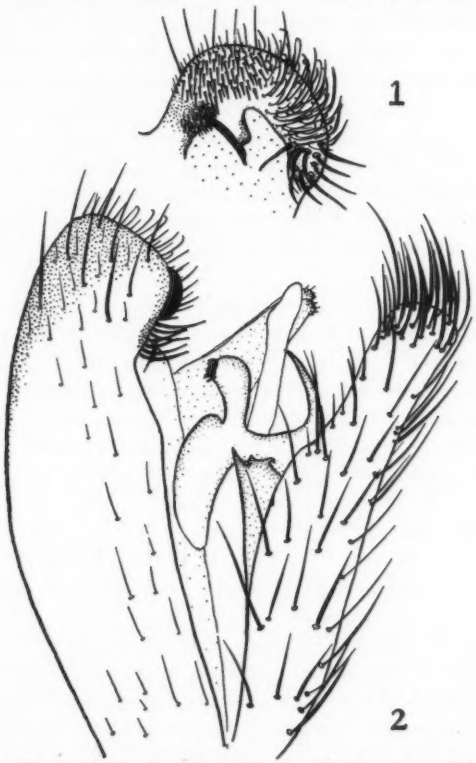


Fig. 1. *Neoempheria flavohirta* (Coq.). Mesal aspect of 9th tergum half, caustic potash preparation of male terminalium. Fig. 2. *Neoempheria flavohirta* (Coq.). Lateral aspect of entire male terminalium, morphological dorsum on left.

The Group Behavior of 14,000 Insects to Colors

By HARRY B. WEISS, Highland Park, New Jersey.

During the course of experimental work, over a period of three years, involving the behavior of certain insects to light of various wave-lengths, the group behavior patterns of various species were observed and reported upon in the Journal of the New York Entomological Society.* The present paper is a report on the combined behavior of 23 species. The results of the tests made with each individual species were added together and utilized as if one large test had been made. As a matter of fact, 88 tests were actually made, using 23 different species. By combining the results of these we get a composite type of behavior, not for all insects, but for the 23 species that were actually tested. Such a composite picture is useful in that it furnishes one with a general idea of the group behavior of a large number of insects of various species. It should be kept in mind, however, that the group behavior of individual species, although following the trend of the composite picture, frequently deviates from it.

Briefly, the insects were exposed for from 15 to 30 minutes to 10 wave-length bands of light of equal physical intensities, from 3650 Å to 7400 Å, or from ultraviolet to infrared. The insects were placed in an introduction chamber six feet away from the color chambers. Upon leaving this chamber they were under the influence of 10 different wave-length bands or colors emanating from as many different chambers separated by as many black chambers. At the end of the exposure period all chambers were closed and counts were made. A full explanation of the design of the equipment and of the method for equalizing the physical intensities of the wave-lengths is given in the papers referred to in the footnote.

A total of 14,840 insects was used in the 88 tests. These consisted of 19 species of Coleoptera, 1 species of Diptera, 2 of Hymenoptera and 1 of Hemiptera. The species involved and the numbers of each that reacted positively to the various wave-lengths or colors are shown as follows:

* Weiss, Harry B., Frank A. Soraci and E. E. McCoy, Jr., Jour. N. Y. Ent. Soc., vol. XLIX, p. 1–20; p. 149–159, 1941. Vol. L., p. 1–35, 1942. Vol. LI, in press, 1943.

Species Involved	Numbers Reacting Positively	
Coleoptera		
Macrobasis unicolor Kby.	90	
Celetes basalis Lec.	72	
Coccinella 9-notata Hbst.	68	
Disonycha quinquevittata Say.	62	
Blepharida rhois Forst.	275	
Chrysochus auratus (Fab.)	245	
Lina lapponica Linn.	53	
Galerucella xanthomelaena Schr.	74	
Plagiodera versicolora Laich.	49	
Crioceris asparagi L.	56	
Tetraopes tetraophthalmus Foer.	84	
Hylurgopinus rufipes (Eich.)	67	
Scolytus multistriatus Marsh.	300	
Serica iricolor Say	146	
Macrodactylus subspinosus Fab.	174	
Autoserica castanea Arrow	66	
Galerucella notata (Fab.)	303	
Leptinotarsa decemlineata Say	1,178	
Popillia japonica Newm.	1,034	4,397
Diptera		
Drosophila melanogaster Meigen	730	
Hymenoptera		
Macrocentrus ancylivorus Roh.	32	
Apis mellifica L.	181	
Hemiptera		
Leptocoris trivittatus Say	114	5,454

Of the total 14,840 insects, 10,150 belonged to the Coleoptera and the remainder, 4,690, to the Diptera, Hymenoptera and Hemiptera. In view of the fact that most of the insects were coleopterous ones, two sets of behavior figures and two behavior curves, based on the percentages of the total number reacting positively to the various wave-length bands, are presented. One set deals exclusively with 10,150 coleopterous insects and the other with the 14,840 insects of the four Orders mentioned.

The following table, shows the distribution of the coleopterous insects by themselves and of the coleopterous ones plus those of the other three Orders.

Numbers and Percentages of Insects Reacting and Not Reacting

Total No. Insects Utilized	10,150 (Coleopterous)	14,840 (Several Orders)
Percent remaining in introduction chamber	17	23
Percent in black chamber	7	9
Percent in center	33	31
Percent reacting positively to 10 wave-length bands	43	37
Number reacting positively to 10 wave-length bands	4,397	5,454
Number remaining in introduction chamber	1,719	3,351
Number in black chambers	651	1,445
Number remaining in centre	3,383	4,590
Total	10,150	14,840

Of the 10,150 coleopterous insects, 17 percent remained in the introduction chamber and exhibited no interest, either in colors or darkness. Seven percent went definitely to the black chambers. Forty-three percent reacted positively to the 10 wave-length bands or colors. Thirty-three percent were in the center of the testing equipment at the end of the tests and presumably were on their way to the ten wave-length chambers. However, because they did not reach these chambers they are excluded from further consideration.

It is with the 43 percent or 4,397 coleopterous insects and the 37 percent or 5,454 insects, that selected the various colors, or wave-lengths that we are particularly concerned, and the following table shows the distribution of these insects and the particular color chambers to which they were attracted. For example, 30 percent of the coleopterous insects and 36 percent of all the insects tested went to the ultraviolet band of 3460–3900 Angstrom units, the maximum transmission of the filters taking place at a wave-length of 3650 Angstrom units. Twenty percent of the coleopterous insects and 18 percent of all the insects tested went to the blue-blue-green band which had a maximum transmission at 4920 Angstrom units.

Distribution of Insects Reacting Positively to 10 Wave-Length Bands of Light

Wave-lengths and colors	Wave-length of maximum transmission in Å	Percent of 4397 coleopterous insects reacting positively to wave-lengths	Percent of 5454 insects (several orders) reacting positively to wave-lengths
3460–3900 Å, ultraviolet ..	3650	30	36
4120–4760 Å, violet-blue ..	4360	12	11
4420–5000 Å, blue	4640	7	6
4700–5280 Å, blue-blue-green	4920	20	18
4940–5660 Å, blue-green ..	5150	14	13
5300–5760 Å, yellow-green.	5460	7	6
5550–6070 Å, yellow-yellow-green	5750	3	3
5900–6420 Å, yellow-orange	6060	3	3
6120–6860 Å, orange-red ..	6420	3	3
6620–7400 Å, infrared ...	7200	1	1
		100	100

By plotting the percentages of response as shown on Figure 1, we get two curves, which are more or less identical and which show the composite qualitative group behavior pattern for the species under consideration. In both cases the peak response occurred at 3650 Å, with a secondary peak at 4920 Å. The color sensations which the particular wave-length bands give rise to in man are shown at the top of Figure 1, the ultraviolet, of course, being invisible to us.

It is not implied that these curves do anything more than suggest the type of group behavior pattern that exists for the species under consideration, when they are exposed to different wave-lengths of light of equal physical intensities. Within certain limits variations in group behavior are to be expected, especially when one considers the various factors that influence group behavior to light.

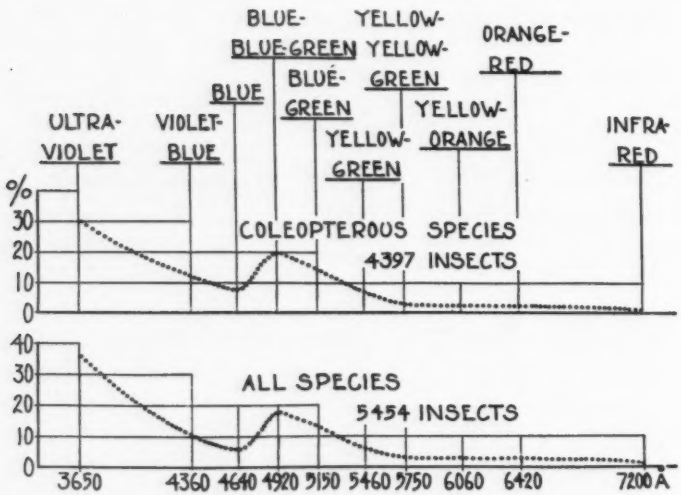


Fig. 1. Group behavior curves of insects to colors.

Ecologically Interrelated Insects on a Sunflower

(Hymenoptera, Formicoidea, Ichneumonoidea and Chalcidoidea; Hemiptera, Membracidae and Aphididae; Diptera, Syrphidae.)

By C. Brooke Worth, Edward Martin Biological Laboratory, Swarthmore College, Swarthmore, Pennsylvania.

During the late Summer and early Autumn of 1941 I found occasion to study a varied population of insects that had its basis in the presence of a large sunflower plant in a backyard of West Philadelphia. My observations extended from September 13 to November 16, during which time the levels of abundance of various ecologically interrelated insect-inhabitants of the plant underwent a series of interesting fluctuations. No attempt will be made here to contribute to the life history of any of the insect-species mentioned. This is, rather, a story of the struggle for survival waged by each species against- or in coöperation

with- each of the other species. So far as that struggle may be defined in terms of the numbers of each species present at any given time, this narrative will disclose the degrees of success or failure experienced by members of the insect-community during its last-minute stand against impending conditions of Winter.

A graph, showing how numbers of ants, membracids, aphids and syrphid maggots fluctuated in abundance during the two-month period of these observations, is presented for reference during perusal of the following text. It was not found expedient to include various species of hymenopterous parasites of the apids and syrphids in this text-figure.

On September 13 the sunflower plant bore about one hundred membracids, *Entylia carinata,* on its lower leaves. These were attended rather carelessly by a smaller number of ants. Subsequent observation showed that at this time the population of membracids was declining: the ants' desultory care may therefore have been occasioned by the membracids' senescence.

No evidence of insect-parasitization upon the membracids was observed. During the last week of September, when aphids first appeared on the plant, the remaining membracids were all but abandoned by their ant-hosts, with the result that the rapidly disappearing hoppers spent their last few days in ecologic isolation from other insects, both friendly and hostile.

Aphids were first noted on the sunflower plant on September 23. These were small wingless light-green forms, and in the beginning they were attended with great solicitude by the ants. Between September 23 and October 4 the ants were extremely busy setting out colonies of these tiny insects. During that period the ants reached the climax of their own abundance on the plant. The sunflower's condition at this time seemed ideal for the culture of aphids, its leaves and sepals exuding a syrupy secretion in great bounty.

No sooner had the apid colonies been established than hover-flies arrived to deposit eggs on the sunflower's leaves and stem. The resulting maggots did not fare well at first, possibly because the aphids were too small and too widely scattered on the plant. But during mid-October the aphids reproduced parthenogenetically until at least a thousand were present. Each leaf

was now heavily populated on its lower surface, and syrphid maggots could find prey that was universally distributed. The population of maggots rose abruptly. A concomitant decline in the numbers of aphids must have been due chiefly to their mechanical reduction by the voracious syrphids.

The ants in the meantime were steadily becoming less common on the plant. Some still visited the aphids, a few of the later being actually carried alive down the plant's stem to the ants' burrow. But in general the ants seemed to occupy themselves elsewhere, as if the aphid population had gotten so far out of hand that they eventually abandoned it. In reality, however, this late stock-project on the part of ants afforded provision for the natural feral perpetuation of aphids. Many late October ant-cows acquired wings, copulated and flew away. Thus a generation of wild aphids was assured for the following year, whether or not the ants succeeded in nurturing domestic aphids underground during the winter.

The beginning of November marked 1941's first severe frost in West Philadelphia. Ants had disappeared entirely a few days previous to this event. The few remaining aphids were killed by freezing, while the apparently hardy syrphid maggots starved to death shortly following the last aphid's demise.

The above populational changes are shown graphically in the text-figure that accompanies this report. Numerical abundance is shown in terms of the percent of maximum abundance of each of the four species mentioned on various dates. It is now of interest to see how these natural and interrelated events were modified through the agency of hymenopterous parasites that harried both the aphids and their syrphid enemies. No attempt to parasitize ants was seen.

The first evidence of aphid-parasitization appeared on September 28 in the form of a small and slender species of Ichneumon wasp. This was a nervous insect that darted frequently into the aphid colonies, "stinging" numerous victims by thrusting its abdomen forward between widely-spread legs and piercing the aphids with an ovipositer that was brought, through this antic, practically under the wasp's own nose! At times the ichneumon fled upon the approach of ants. But if the ants

surprised it in the act of oviposition, the wasp became immobile and suffered itself to be "nibbled" as if it were an aphis. The ants seemed to be deceived, for they never became hostile toward the wasps. Had the former possessed human intelligence, they would have recognized the deleterious import of ichneumons among aphids. The "freezing" behavior of the wasps, however, indicates that some intimation of wasp-undesirability has sometime impressed itself on the ant tribe; otherwise there would be no resultant advantage today in ichneumon's mimicry of aphids. The extent to which such conduct has advanced among parasites will be even more strikingly detailed below in the case of a chalcid hyperparasite.

An aphis' response to the onslaught of a slender ichneumon wasp was not highly specialized. It would "rear up" in reverse, waving the tip of its swollen abdomen as if in invitation to an ant's milking. Not attended in this way, it would quickly become passive, whereupon the wasp promptly accomplished its egg-laying purpose.

On October 6 I detected the presence of a stocky chalcid wasp in the aphis colony. This species was of the same size and color as its ichneumon cousin, but its visit was of deeply different significance. The creature exhibited remarkable behavior. Not only did it "freeze" when accosted by an ant, allowing itself to be nibbled and "milked" just as if it were an aphis itself, but upon the ant's departure it assumed that guardian's peculiar demeanor by nibbling and milking aphids in its own turn. The wasp's entire behavior signified confidence in the righteousness of its mission among the aphids and ants, for it was a superparasite, bent on destroying ichneumons; it was therefore of benefit not only to the formicine herdmaidens but also to their flocks.

Deliberation was the keynote of its antics. I have indicated already the assurance with which it patrolled the aphis colonies. Its oviposition was likewise calmly accomplished. Approaching aphis after aphis, it stroked the proposed victims gently with its fore-legs. If an aphis reared up in defense, the wasp passed on in apparent dissatisfaction. But once in a while the wasp encountered an unresponsive aphis. This may have indicated

that the aphis was already suffering the effects of parasitization by an ichneumon larva. At any rate the chalcid now turned slowly until the tip of its abdomen touched the aphis and then "stung" it *from the rear,* quite opposite from the ichneumon's technique.

Chalcids "stung" aphids much less frequently than did ichneumons. This seems reasonable when it is remembered that chalcids must be much more selective in their choice of prey than ichneumons. It is more difficult to find parasitized aphids than healthy ones, when the aphis colony is made up largely of normal individuals.

The chalcid's deliberation probably stems from the care it must use in selecting its prey. This tactic has led it to mimic aphids in the ants' presence, just as is the custom of ichneumons. But in addition chalcids have learned *to mimic ants in the ants' absence.* Thus they are enabled to make detailed examinations of the aphids in order to discriminate between healthy ant-cows and ichneumon-infested ones.

The ants and aphids alike seem finally to have given up most attempts to distinguish among the supernumerary creatures that attend their society. As we have seen there is still some rudimentary hostility toward wasps, regardless of the latter's species. Toward syrphid maggots, however, there seems to be no reaction whatsoever. These should be the most deadly and terrifying enemies of all, yet they are permitted to occupy central positions in the aphis colonies and to share the ants' protection along with the mysteriously disappearing aphids. The ants "nibble" syrphid maggots frequently, being sometimes rudely lashed by the untamed carnivores. Many an aphis may also be disturbed by a maggot's lumbering changes of position, but on the whole there is no visible attempt by ants or aphids to escape from- or to eliminate- the ravenous nuisances in their midst.

Not that syrphids lead lives entirely free from trouble. On the contrary the maggots on this sunflower plant were harassed by three additional species of proportionately larger ichneumon wasps, a short account of which will now be given. I do not know if any of these wasps was hyperparasitic on either of the others: suffice it to say that all three were seen to "sting" syrphid maggots at every stage of the latter's existence.

The first two species were detected on October 16. One was an iridescent creature, brilliant green except for a golden-copper dorsal abdominal surface. The second was nondescript, more slender and nervous, possessing mottlings of black, white and brown on its body, legs and wings. Both these species "stung" many young maggots.

These two wasps were seen on several other occasions, the slender species being sometimes present in some number. On October 22 a third species was observed. This one was also slender, but it had a humped thorax, shining black abdomen and wholly unmarked transparent wings. It first *bit* a syrphid maggot, then turned and "stung" it.

During the era of the three syrphid-wasps' activities, hoverflies were abundantly present, laying their eggs promiscuously on all parts of the sunflower plant. The adult syrphids were tame, allowing me to watch them through a magnifying glass while they selected sites for their ova. The tips of their ovipositors pulsated rapidly before each egg appeared, delicately testing each locus as if by some refined tactile or gustatory sense.

A few additional insects occupied stations on the sunflower plant throughout this history, the only other species directly related to the ecologic complex being represented by a number of lady-bugs which systematically devoured a daily quota of aphids. The lady-bugs, however, came into contact with no other members of the insect-association.

It may now be profitable to inquire how these several organisms were economically related to one another and to their vegetable host, the sunflower plant. This may be done most readily be grouping the insects in a series whose classes progressively depend less and less upon the sunflower for direct nutrition and protection.

The sunflower plant itself suffered no apparent harm from the feasting of almost 1500 insects on its nutritive exudates. Whether it secreted these substances naturally or in response to repeated insect-bites I cannot say. The plant blossomed normally, however, and produced a large crop of seed which was subsequently proven to possess an average percentage of fertility.

Insects observed to derive direct benefit from the sunflower plant included randomly-appearing leaf-hoppers, spotted beetles, hunting spiders, house and green-bottle flies, as well as the constantly attending ants.

Insects of the second order were membracids, mentioned early in this report, and aphids. Both these species fed on sunflower-plant juices, but their presence was under direction of the ants and therefore not purely fortuitous. It is possible that all the species thus far mentioned were harmful—or at least not beneficial—to the plant.

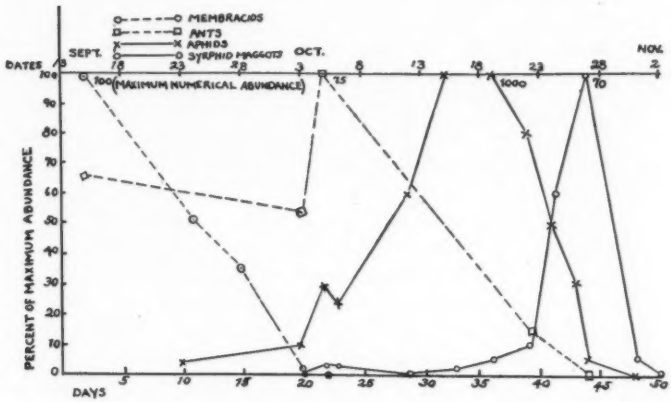
Insects of the third order were those attracted by the presence of aphids. These were small ichneumon wasps, syrphid flies and maggots, and lady-bugs. If it be assumed that aphids are detrimental to sunflowers, these three insects were beneficial to the plant and at odds with primary purposes of the ants.

Insects of the fourth order were those attracted to the plant by the presence of ichneumon-infested aphids and of carnivorous syrphid maggots. The first of these, a chalcid wasp, worked in favor of the ants and indirectly against the interests of the sunflower plant by parasitizing ichneumon-infested aphids. The same significance attends the presence of three larger species of ichneumon wasps, for these parasitized syrphid maggots which were hostile to aphids.

If one of the syrphid-parasitic wasps was in reality a hyper-parasite upon syrphid maggots that were already ichneumon-infested, a class of insects of the fifth order would have to be created to accommodate it. This conjecture was not established, however, in the above study.

It should be noted that no vertebrate animal entered into the scheme of ecologic sequences here outlined. In some locality more rural than West Philadelphia an exploring Vireo or Wren might have interrupted the course of these highly-tensed events, just as an inquisitive star might tomorrow sniff at our world and quickly notify us how puerile are our own attempts to write important human history.

I wish to thank Eleanor M. Paxson for preparing the graph that appears in this entomological note.



BIOLOGY THE SCIENCE OF LIFE. A GENERAL BIOLOGY TEXT FOR FIRST YEAR COLLEGE STUDENTS. By MARY STUART MACDOUGALL and ROBERT HEGNER. x + 963 pages. McGraw Hill Book Co. 1943. Price $4.00. An extensive general survey text conveniently divided into sections: The Foundations of Biology, Plant Biology, Animal Biology, Organ Systems and their Functions, The Biology of Man, Biological Principles and Theories, Applied Biology, and The History of Biology. The Arthropoda are given a chapter of 57 pages with relatively detailed treatment of the Crayfish, Grasshopper and Honey Bee, and shorter survey of the entire group—A. G. Richards, Jr.

IN RETROSPECT

In 1876, the American Entomological Society became affiliated with the Academy of Natural Sciences of Philadelphia, and its members formed the Entomological Section of that institution. At the October 24, 1899, meeting of the Section, Mr. Eugene M. Aaron moved that "this Section shall, beginning with January 1890, publish its Proceedings, and such short notes as may be offered, at or near the first of each month, That all matters pertaining to this journal be referred to the entire Publication Committee, with full powers." This Publication Committee consisted of E. T. Cresson, Chas. A. Blake and Benj. H. Smith, representing the American Entomological Society, and Henry Skinner and Philip Laurent representing the Section. This Committee held a meeting November 28th with E. T. Cresson in the chair, and "duly considered the subject and [the members] are of the opinion that such a publication, if properly, wisely and economically managed, could be maintained and be made a useful and valuable adjunct to both the Section and Society. They would propose that at least 160 pages be published annually in ten numbers, monthly parts—omitting the months of July and August—of uniform size with the Transactions of the Society, and with the title of "Entomological News and Proceedings of the Entomological Section of the Academy of Natural Sciences of Philadelphia." The subscription price to be One Dollar per copy per annum, free, however, to members and associates of the Section. The expenses of publication to be defrayed by the receipts from subscriptions, advertisements, etc., and, whatever sum the Section can appropriate from its funds, and in case of a deficit, the same be met by a contribution—not to exceed $100.00 per annum—from the funds in the hands of the Publication Committee of the Society. The new publication to be under the management of the Joint Publication Committee of the Section and Society, who shall elect an Editor and an Advisory Committee of four persons to conduct the publication, subject to such rules and regulations as the Joint Committee may establish, the said Committee to make a report of its proceedings to the Section at least four times each year. In

order to obtain, for the Library of the Society, certain publications for which it is not desirable to exchange its Transactions, it is proposed that the Publication Committee of the Society subscribe to say 50 copies of the new publication for use in making such exchanges for the Library of the American Entomological Society."

Eugene M. Aaron was elected Editor, E. T. Cresson, Treasurer, Geo. H. Horn, E. T. Cresson and Henry Skinner constituted the Advisory Committee. Dr. Horn moved that the Section be asked to allow Mr. Philip P. Calvert to associate with them.

At a meeting of the Committee, held Monday evening, December 9, 1889, it was agreed that the contract for printing 500 copies, complete, be awarded to P. C. Stockhausen, at $27.00 per number. It was further agreed to have printed 250 extra copies of numbers 1 and 2 each for use as sample copies; and the Editor was authorized to have 2000 circulars printed, and "distribute them in one cent stamped envelopes to be addressed to those interested in Entomology." The first number appeared in the mails, January 14, 1890, and contained 16 pages. The first two pages carried the following Announcement:

It has for some time been apparent to Entomologists in this country that there was unoccupied room for a journal of Entomology devoted less to the dry details of descriptive and classificatory work and more to the news and gossip which is always of interest to entomological workers. The field of descriptive entomology is already well filled by journals published in Brooklyn, N. Y., and London, Ontario; that of economic entomology by a government publication at Washington, and the bibliographic department has received special attention at Cambridge, Mass. None of these journals allude systematically to the important work always in progress in Europe and elsewhere, nor do they by any means regularly notice such work appearing here from time to time. News of this sort is of great value to the student of Entomology even if he is near one of the large libraries; to those remote from these centres of information it can not fail to be of the utmost importance. A journal which will keep entomologists *en rapport* with what is being accomplished in serials and by monographs at home and abroad, and which will also give the items of interesting news concerning explorations and ex-

plorers, collections and collectors, will, it is believed, win its way into the good graces of the insect collecting fraternity. Such a journal is only possible where its conductors are in close communication with the literature of Entomology and the sister sciences. Philadelphia, the possessor of the public libraries of the Academy of Natural Sciences, the American Entomological Society and the American Philosophical Society and several private libraries rich in works on special branches of Entomology, is generally conceded to occupy a position in this field unrivaled in America.

With this in view the Entomological Section of the Academy of Natural Sciences of Philadelphia, with the co-operation and financial aid of the American Entomological Society, have decided to publish, beginning with this number, a journal to appear about the 1st of each month, July and August excepted, under the editorial and advisory direction set forth on the cover.

Besides such scientific papers as will naturally appear in a journal published under these auspices, there will be departments of "Notes and News," "Queries and Answers," "Exchange," "Doings of Societies," etc. Under the first it will be the object of its conductors to make ENTOMOLOGICAL NEWS deserve its name in the widest sense. Under the second, so far as may be possible, insects sent for determination will be named by members of the Section and the results announced therein. The department of "Exchange" will be free to all under reasonable restrictions. And, finally, it will be the aim to give a brief résumé of the proceedings of the various Entomological Societies throughout the world.

With liberal patronage and support from the Entomologists of America and elsewhere, it is intended that ENTOMOLOGICAL NEWS shall grow into an important factor in every entomologist's work. It will be enlarged, and its scope modified or increased, as its readers may seem to demand. This issue will give but a faint idea of what it is proposed shall be the scope of ENTOMOLOGICAL NEWS. Its conductors will be glad to receive from its readers, at any time, criticisms of its work and suggestions for its improvement.

Scientific papers, news-notes, reports of societies, etc., are needed from all sources to make this journal just what its name implies, a compend of entomological news.—EUGENE M. AARON.

Thus was Entomological News born. Some account of its subsequent growth and incidents in its life will be given in another issue of this journal.—E. T. Cresson, Jr.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

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LIST OF JOURNALS CITED

1.—Trans., Amer. Entomol. Society. 3.—United States Dept. Agriculture. 4.—Canadian Entomologist. 6.—Jour., New York Entom. Soc. 7.—Ann., Entom. Soc. America. 9.

—The Entomologist. 10.—Proc., Entom. Soc. Washington. 12.—Journal, Economic Entom. 17.—Journal of Parasitology. 21.—Entom. Record & Jour. of Variation. 22.—Bulletin of Entom. Research. 23.—Physiological Zoology. 26.—Bull., Mus. Comparative Zool. 31.—Nature, London. 35.—Revista, Soc. Mexicana Hist. Nat. 40.—American Mus. Novitates. 44.—Revista Chilena Hist. Nat. 57.—Journal of Morphology. 64.—Bull., Acad. Sci., URSS., Biol. Ser. 70.—Entomologica Americana. 75.—Annals & Magazine Nat. Hist. 91.—Jour., Washington Acad. Sci. 103.—Jour., Kansas Ent. Society. 104.—Revista, Soc. Entomol. Argentina. 109.—Proc., R. Entomol. Soc. London (C). 117.—Microentomology, Stanford Univ. 128. Papers, Mich. Acad. Sci. Arts & Let.

OBITUARIES

Science for April 30, 1943, announced the death, on April 15, of Dr. Richard Anthony Muttkowski, head of the department of Biology of the University of Detroit since 1925. He was 56 years old, having been born in Milwaukee, Wisconsin, on March 4, 1887. He received an A.B. from St. Lawrence College, Colorado, in 1904 and again from the University of Wisconsin in 1913, and Ph.D. from the latter institution in 1916. He was assistant in the department of invertebrate zoology of the Milwaukee Public Museum 1906–12. Subsequent to his doctor's degree, he was successively in the zoological departments of the University of Missouri, Kansas State College, the University of Idaho and finally Detroit. He served as an instructor in the American Expeditionary Forces in France in 1919.

In his years at Milwaukee, under Brues and Graenicher, he gave much attention to insects and especially Odonata, and became best known to entomologists by his Catalogue of the Odonata of North America, issued as the first Bulletin of the Museum, June 27, 1910. Excluding handbooks, it is still the latest in this field. At that time Ris's monograph of the Libellulinae in the Catalogue of the Zoological Collections of Edmond de Selys Longchamps was in course of publication at Brussels. Some of us wondered why Muttkowski did not wait until this monograph was finished before issuing his Catalogue. It may be worth while to put on record here his reason: ". . . the reason

that I did not wait with the catalogue till Ris' Libellulinae was published, is that notwithstanding its great scientific importance, this monograph will not be available to the average entomologist, but to those only in the very largest and most important centers of scientific work. The limited circulation [of Ris's Libellulinae] (180 copies M. Severin wrote me) and the rather high price will prevent its general use. This is unfortunate, since the monograph is so valuable." (Letter of September 13, 1910.) This was before the breaking out of World War I, which seriously delayed the publication of Ris's work; for while the first eight fascicles were issued in 1909–13, the final one (No. 16, part 2) was not distributed until March 1, 1919. To have waited for this last would have postponed the appearance of Muttkowski's Catalogue for nine years, so that his decision not to wait was justified by events which he could not have foreseen.

Muttkowski's published work on Odonata, other than his Catalogue, dealt mainly with the Wisconsin fauna and a study of the genus *Tetragoneuria* (1911, 1915). Two of his later papers, including Odonata and other insects, were ecological: The Fauna of Lake Mendota (1918) and The Ecology of Trout Streams in Yellowstone National Park (1929). He also studied the blood of insects while at the University of Idaho (three papers in the Bulletin of the Brooklyn Entomological Society L923–24). We understand that his latest work was in experimental zoology.—Philip P. Calvert.

Science for June 11, 1943, announces that Wesley P[illsbury] Flint, chief entomologist of the Illinois State Natural History Survey and of the College of Agriculture of the University of Illinois, died on June 3, at the age of sixty-one years. He was joint author, with C. L. Metcalf, of the favorably known texts, Destructive and Useful Insects and Fundamentals of Insect Life. He was born at South Hampton, New Hampshire, May 4, 1882, and served with the Massachusetts Gipsy Moth Commission before going to Illinois in 1908.—Philip P. Calvert.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Tropical Lepidoptera and Insects. Also domestic species. Will exchange or buy specimens. M. A. Zappalorti, 253 Senator Street, Brooklyn, N. Y.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

Coccinellidae wanted from all parts of the world, especially South and Central America. Buy or exchange. G. H. Dieke, 1101 Argonne Drive, Baltimore, Md.

Coleoptera—Will exchange mounted and labeled specimens from North America. All groups except Rhynchophora. G. P. Mackenzie, 1284 Sherwood Road, San Marino, Calif.

Lepidoptera—Should like to hear from collectors interested in species from central Alberta and Saskatchewan. Would collect other Orders. Paul F. Bruggemann, R. R. 1, Furness, Sask., Canada.

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